UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/620,029	07/14/2003	Christopher P. Schaffer	IR-2241 (2-3352)	7499

2352 7590 12/16/2004

OSTROLENK FABER GERB & SOFFEN
1180 AVENUE OF THE AMERICAS
NEW YORK, NY 100368403

EXAMINER	
HA, NATHAN W	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 12/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/620,029	SCHAFFER, CHRISTOPHER P.	
	Examiner	Art Unit	
	Nathan W. Ha	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *20 January 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-31* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-31* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date *1/04*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. Figure 2 should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 102

2. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

3. Claims 1-6, 14-16, 18-20, and 28-29 are rejected under 35 U.S.C. 102(e) as being anticipated by Standing, US 6,677,669.

In regard to claims 1 and 18, in fig. 8, Standing discloses a multi-chip module comprising:

a substrate 45 (col. 4, line 12) having a first conductive pad 49 (col. 4, line 38), a second conductive pad , also, 49 and a third conductive pad 43 (col. 3, lines 65-66) disposed on a major surface thereof;

a conductive element (combination of elements 12 and 42, fig. 8), said conductive element including a web portion at the element 12, and a connector 42 extending from a first major surface of said web portion;

a first semiconductor die (MOSFET) 18 (col. 3, lines 3-4, and fig. 7) and a second semiconductor die (MOSFET) 36 (col. 3, lines 46-47, and fig. 7), each semiconductor die having a first contact of a first designation 20, 20' (fig.8, col. 4, line 28)disposed on a first major surface thereof and a second contact of a second designation 24, 24' disposed on a second opposing major surface thereof (fig. 8, col. 4, line 36) wherein the first contact of the first semiconductor die is electrically connected to the first conductive pad, the second contact of the second semiconductor die is connected to the second conductive pad, the connector is connected to the third conductive pad, and the second contact of the first semiconductor die and the first contact of the second semiconductor die are connected to the first major surface of the web portion.

In regard to claims 2 and 19, wherein said substrate is one of an insulated metal substrate (see col. 3, lines 66-67.)

In regard to claim 3, Standing further discloses that the semiconductor dies are MOSFETS (col. 3, lines 5-6), the first contacts of which are source contacts (col. 4, lines 27-28) and said second contacts of which are drain contacts (col. 4, lines 34-35).

In regard to claim 4, Standing further discloses wherein each of said semiconductor die is one of MOSFET and IGBT (see col. 3, line 6, and col. 4, line 20).

In regard to claims 5 and 20, Standing further discloses the device is in a molded housing, between the substrate and the conductive elements (col. 4, lines 2-4.)

In regard to claim 6, wherein said conductive element is at least partially exposed through said molded housing to dissipate heat from said semiconductor die. Element 12 together with element 40 are capable of thermal dissipation.

In regard to claims 14-16 and 28-29, wherein the web portion includes a recess at the end (fig. 8.)

Claim Rejections - 35 USC § 103

4. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

5. Claims 7-10, 13, 21-24, and 27 are rejected under 35 U.S.C. 103(a) as being unpatentable over Standing as applied to claims 1-6, 14-16, 18-20, and 28-29 above.

In regard to claims 7-10, 13, 21-24, and 27, Standing discloses all of the claimed limitations as mentioned above. Standing further discloses the shape of the conductive

element at the sides, for example, stair shape. Standing, however, does not expressly disclose that the conductive element such T-shape, L-shape.

At the time of the invention was made, it would have been obvious to a person of ordinary skill in the art to modify the shape of the conductive element because applicant has not disclosed that these shapes] provide an advantage, is used for a particular purpose, or solve a stated problem. One of ordinary skill in the art, furthermore, would have expected applicant's invention to perform equally well with either shape because [they perform the same function of molding the module to the substrate.

Therefore, it would have been obvious to one of ordinary skill in the art to modify Standing to obtain the invention as specify in the above claims.

Indeed, it has been held that mere dimensional limitations are prima facie obvious absent a disclosure that the limitations are for a particular unobvious purpose, produce an unexpected result, or are otherwise critical. See, for example, In re Rose, 220 F.2d 459, 105 USPQ 237 (CCPA 1955); In re Rinehart, 531 F.2d 1048, 189 USPQ 143 (CCPA 1976); Gardner v. TEC Systems, Inc., 725 F.2d 1338, 220 USPQ 777 (Fed. Cir. 1984), cert. denied, 469 U.S. 830, 225 USPQ 232 (1984); In re Dailey, 357 F.2d 669, 149 USPQ 47 (CCPA 1966).

Note that the specification contains no disclosure of either the critical nature of the claimed dimensions of any unexpected results arising therefrom. Where patentability is aid to be based upon particular chosen dimensions or upon another

variable recited in a claim, the Applicant must show that the chosen dimensions are critical. In re Woodruff, 919 F.2d 1575, 1578, 16 USPQ2d 1934, 1936 (Fed. Cir. 1990).

6. Claims 11-12 and 25-26 are rejected under 35 U.S.C. 103(a) as being unpatentable over Standing as applied to claims 1-6, 14-16, 18-20, and 28-29 above, and further in view of Yoshikawa (US 2002/0175404).

In regard to claims 11-12 and 25-26, Standing discloses all of the claimed limitations accept a heat sink in thermal contact with the substrate.

Yoshikawa, in fig. 3, discloses an analogous device including a substrate 8 (section [0084], line 2), a conductive element 3 (section [0086], line 2), semiconductor devices 1, and further discloses a heat sink 10 (section [0086], line 1) that in thermal contact with the substrate in order to prevent dewing of the cooling member below it (section [0086]). It is further noted that heat sink is a must have in a semiconductor package since chips generate a large amount of heat during its operation period.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to apply a heat sink over the package as taught by Yoshikawa in order to prevent dewing of the cooling member below it and to set the temperature of the device at an optimum temperature.

7. Claims 17 and 30-31 are rejected under 35 U.S.C. 103(a) as being unpatentable over Standing as applied to claims 1-6, 14-16, 18-20, and 28-29 above, and further in view of Nakamura, US 6,340,842.

In regard to claims 17 and 30-31, Standing discloses all of the claimed limitations as mentioned above accept that the element include a ball contact. It should be noted

that solder balls are widely used in the art of semiconductor to make electrical contact between device since solder is easy to form during a re-flow at a lower temperature. The pad as taught by Standing is made of solder material. It could have been in a ball shape as commonly made in the semiconductor device's connections. For example, Nakamura, in fig. 10, discloses an analogous device including a substrate14, a conductor 20, semiconductor devices, contact 50, and a conductive element disposed on top of the substrate to mold the device. Nakamura further discloses that the contact further includes a solder ball 16 (col. 4, line 59) in order to provide electrical connections therein, since solder has low melting temperature, there device, therefore, can be easily separated from the substrate for testing semiconductor that molded inside the package.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention was made to use solder balls at the connections between upper part and the substrate in order to provide electrical connections therein, since solder has low melting temperature, there device, therefore, can be easily separated from the substrate for testing semiconductor that molded inside the package.

Conclusion

8. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Nathan W. Ha whose telephone number is (571) 272-1707. The examiner can normally be reached on M-TH 8:00-7:00(EST).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Wael Fahmy can be reached on (571) 272-1705. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Nathan Ha
December 7, 2004